

Yen-Ming Hsu, Ph.D.

Accomplished biochemist with broad expertise in developing antibody drugs. In depth knowledge and real project experience in protein engineering, cell biology and B cell immunology. Track record in development of therapeutic biologics from research/exploratory stages to preclinical phase. Expertise in assay development for analytical and developmental candidates. Well versed in development processes of protein and antibody drugs. Seasoned industry manager/scientist and with a good balance between scientific research and business needs.

Professional Experience

AB Biosciences, Inc., Allston, MA,	CEO	12/2011 – To Date
AB Biosciences, Inc., Allston, MA,	Senior Investigator	02/2011 – 11/2011
BiogenIdec, Inc., Cambridge, MA,	Drug Discovery, Section Head	2003 – 2011
Biogen Inc., Cambridge, MA,	Protein Engineering, Principal Scientist	2001 – 2003
	Protein Engineering, Senior Scientist	1996 – 2001
	Protein Chemistry, Scientist II	1990 – 1996

Education

Harvard University, Cambridge, Massachusetts 1985 – 1990

Research Fellow, Department of Biochemistry and Molecular Biology (BMB) 1987 – 1990
Discovered how low potassium diet triggers reduction of muscle mass which minimizes loss of the potassium ions in order to support the sodium pump (Na⁺, K⁺ ATPase) activity in the central nerve system.

Post-doctoral Fellow, Professor Guido Guidotti, Dept. Biochemistry and Molecular Biology 1985 – 1987
Discovered the $\alpha 3$ isoform of sodium pump (Na⁺, K⁺ ATPase) protein and showed that it is expressed in rat brain.

Michigan State University, East Lansing, Michigan

Graduate Program, Professor John L. Wang, Department of Biochemistry 1981 – 1985
Identified a protein that inhibits growth of mouse fibroblast in a density-dependent fashion.

National Taiwan University Medical School, Taipei, Taiwan

Master Program, Professor Ta-Cheng Tung, Department of Biochemistry
Demonstrated that antitumor immunity can be induced in Balb/c mice vaccinated with tumor cells treated with abrus agglutinin. 1975 – 1977

Taipei Medical University, Taipei, Taiwan

B.S., School of Pharmacy 1971 – 1975

Publications

1. Invited Review Articles

1. Kalled SL, Ambrose C, Hsu YM. The biochemistry and biology of BAFF, APRIL and their receptors. *Curr Dir Autoimmun.* 2005 8: 206-242
2. Kalled SL, Ambrose C, Hsu YM. BAFF: B cell survival factor and emerging therapeutic target for autoimmune disorders. *Expert Opin Ther Targets.* 2003 7: 115-123

2. Peer Reviewed

1. Shock A, Burkly L, Wakefield I, Peters C, Garber E, Ferrant J, Taylor FR, Su L, Hsu YM, Hutto D, Amirkhosravi A, Meyer T, Francis J, Malcolm S, Robinson M, Brown D, Shaw S, Foulkes R, Lawson A, Harari O, Bourne T, Maloney A, Weir N. CDP7657, an anti-CD40L antibody lacking an Fc domain, inhibits CD40L-dependent immune responses without thrombotic complications: an in vivo study. *Arthritis Res Ther.*, 2015 Sep 3;17:234.
2. Michaelson JS, Amatucci A, Kelly R, Su L, Garber E, Day ES, Berquist L, Cho S, Li Y, Parr M, Wille L, Schneider P, Wortham K, Burkly LC, Hsu YM, Joseph IB. Development of an Fn14 agonistic antibody as an anti-tumor agent. *MAbs*, 2011 4:362-375.

3. Maia S, Pelletier M, Ding J, Hsu YM, Sallan SE, Rao SP, Nadler LM, Cardoso AA. Aberrant expression of functional BAFF-system receptors by malignant B-cell precursors impacts leukemia cell survival. *PLoS One*. 2011 6:e20787.
4. Kang YJ, Wang X, Lin SJ, Hsu YM, Chang HC. An active CD8 α /pMHC1 interaction is required for CD8 single positive thymocyte differentiation. *Eur J Immunol*. 2010 40:836-48.
5. Robles-Carrillo L, Meyer T, Hatfield M, Desai H, Dávila M, Langer F, Amaya M, Garber E, Francis JL, Hsu YM, Amirkhosravi A. Anti-CD40L immune complexes potently activate platelets in vitro and cause thrombosis in FCGR2A transgenic mice. *J Immunol*. 2010 185:1577-1583
6. Sonar SS, Hsu YM, Conrad ML, Majeau GR, Kilic A, Garber E, Gao Y, Nwankwo C, Willer G, Dudda JC, Kim H, Bailly V, Pagenstecher A, Rennert PD, Renz H. Antagonism of TIM-1 blocks the development of disease in a humanized mouse model of allergic asthma. *J Clin Invest*. 2010 120:2767-2781
7. Jain M, Jakubowski A, Cui L, Shi J, Su L, Bauer M, Guan J, Lim CC, Naito Y, Thompson JS, Sam F, Ambrose C, Parr M, Crowell T, Lincecum JM, Wang MZ, Hsu YM, Zheng TS, Michaelson JS, Liao R, and Burkly LC. A Novel Role for Tumor Necrosis Factor-like Weak Inducer of Apoptosis (TWEAK) in the Development of Cardiac Dysfunction and Failure. *Circulation*, 2009 119:2058-2068
8. Chang HC, Tan K, Hsu YM. CD8 $\alpha\alpha$ has two distinct binding modes of interaction with peptide-major histocompatibility complex class I. *J Biol Chem*. 2006 281:28090-28096
9. Girgenrath M, Weng S, Kostek CA, Browning B, Wang M, Brown SA, Winkles JA, Michaelson JS, Allaire N, Schneider P, Scott ML, Hsu YM, Yagita H, Flavell RA, Miller JB, Burkly LC, Zheng TS. TWEAK, via its receptor Fn14, is a novel regulator of mesenchymal progenitor cells and skeletal muscle regeneration. *EMBO J*. 2006 25:5826-5839
10. Michaelson, J.S., Cho, S., Browning, B., Zheng, T.S., Lincecum, J.M., Wang, M.Z., Hsu, YM, and Burkly, L.C. Tweak induces mammary epithelial branching morphogenesis. *Oncogene*, 2005 24: 2613-2624
11. Zhang X, Park CS, Yoon SO, Li L, Hsu YM, Ambrose C, Choi YS. BAFF supports human B cell differentiation in the lymphoid follicles through distinct receptors. *Int Immunol*. 2005 17:779-788
12. Day ES, Cachero TG, Qian F, Sun Y, Wen D, Pelletier M, Hsu YM, Whitty A. Selectivity of BAFF/BLyS and APRIL for binding to the TNF family receptors BAFFR/BR3 and BCMA. *Biochemistry*. 2005 44: 1919-1931
13. Mathur P, Murray B, Crowell T, Gardner H, Allaire N, Hsu YM, Thill G, Carulli JP. Murine peptidoglycan recognition proteins PGRPL α and PGRPL β are encoded in the epidermal differentiation complex and are expressed in epidermal and hematopoietic tissues. *Genomics*. 2004 83: 1151-1163
14. Ferrant JL, Benjamin CD, Cutler AH, Kalled SL, Hsu YM, Garber EA, Hess DM, Shapiro RI, Kenyon NS, Harlan DM, Kirk AD, Burkly LC, Taylor FR. The contribution of Fc effector mechanisms in the efficacy of anti-CD154 immunotherapy depends on the nature of the immune challenge. *Int Immunol*. 2004 16: 1583-1594
15. Schneider P, Olson D, Tardivel A, Browning B, Lugovskoy A, Gong D, Dobles M, Hertig S, Hofmann K, Van Vlijmen H, Hsu YM, Burkly LC, Tschopp J, Zheng TS. Identification of a new murine tumor necrosis factor receptor locus that contains two novel murine receptors for tumor necrosis factor-related apoptosis-inducing ligand (TRAIL). *J Biol Chem*. 2003 278: 5444-5454
16. Pelletier M, Thompson JS, Qian F, Bixler SA, Gong D, Cachero T, Gilbride K, Day E, Zafari M, Benjamin C, Gorelik L, Whitty A, Kalled SL, Ambrose C, Hsu YM. Comparison of soluble decoy IgG fusion proteins of BAFF-R and BCMA as antagonists for BAFF. *J Biol Chem*. 2003 278: 33127-33133
17. Larkin R, Benjamin CD, Hsu YM, Li Q, Zukowski L, Silver RF. CD40 ligand (CD154) does not contribute to lymphocyte-mediated inhibition of virulent *Mycobacterium tuberculosis* within human monocytes. *Infect Immun*. 2002 Aug;70(8):4716-20.

18. Karpusas M, Cachero TG, Qian F, Boriack-Sjodin A, Mullen C, Strauch K, Hsu YM, Kalled SL. Crystal structure of extracellular human BAFF, a TNF family member that stimulates B lymphocytes. *J Mol Biol.* 2002 315: 1145-1154
19. da Silva AJ, Brickelmaier M, Majeau GR, Li Z, Su L, Hsu YM, Hochman PS. Alefacept, an immunomodulatory recombinant LFA-3/IgG1 fusion protein, induces CD16 signaling and CD2/CD16-dependent apoptosis of CD2(+) cells. *J Immunol.* 2002 May 1;168(9):4462-71.
20. Jakubowski A, Browning B, Lukashov M, Sizing I, Thompson JS, Benjamin CD, Hsu YM, Ambrose C, Zheng TS, Burkly LC. Dual role for TWEAK in angiogenic regulation. • *J Cell Sci.* 2002 J115(Pt 2):267-74
21. Karpusas M, Lucci J, Ferrant J, Benjamin C, Taylor FR, Strauch K, Garber E, Hsu YM. Structure of CD40 ligand in complex with the Fab fragment of a neutralizing humanized antibody. *Structure* 2001 9: 321-329
22. Su L, Garber EA, Hsu YM. CD154 variant lacking tumor necrosis factor homologous domain inhibits cell surface expression of wild-type protein. *J Biol Chem.* 2001 276: 1673-1676
23. Garber E, Su L, Ehrenfels B, Karpusas M, Hsu YM. CD154 variants associated with hyper-IgM syndrome can form oligomers and trigger CD40-mediated signals. *J Biol Chem.* 1999 274: 33545-33550
24. Singh J, Garber E, Van Vlijmen H, Karpusas M, Hsu YM, Zheng Z, Naismith JH, Thomas D. The role of polar interactions in the molecular recognition of CD40L with its receptor CD40. *Protein Sci.* 1998 7: 1124-1135
25. Atkinson TP, Smith CA, Hsu YM, Garber E, Su L, Howard TH, Prchal JT, Everson MP, Cooper MD. Leukocyte transfusion-associated granulocyte responses in a patient with X-linked hyper-IgM syndrome. *J Clin Immunol.* 1998 18: 430-439
26. Hsu YM, Lucci J, Su L, Ehrenfels B, Garber E, Thomas D. Heteromultimeric complexes of CD40 ligand are present on the cell surface of human T lymphocytes. *J Biol Chem.* 1997 272: 911-915
27. Chicheportiche Y, Bourdon PR, Xu H, Hsu YM, Scott H, Hession C, Garcia I, Browning JL. TWEAK, a new secreted ligand in the tumor necrosis factor family that weakly induces apoptosis. *J Biol Chem.* 1997 272: 32401-32410
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29. Karpusas M, Hsu YM, Wang JH, Thompson J, Lederman S, Chess L, Thomas D. 2 Å crystal structure of an extracellular fragment of human CD40 ligand. *Structure.* 1995 3: 1031-1039
30. Palabrica T, Lobb R, Furie BC, Aronovitz M, Benjamin C, Hsu YM, Sajer SA, Furie B. Leukocyte accumulation promoting fibrin deposition is mediated in vivo by P-selectin on adherent platelets. *Nature.* 1992 359: 848-851
31. Hsu YM, Guidotti G. Effects of hypokalemia on the properties and expression of the (Na⁺,K⁺)-ATPase of rat skeletal muscle. *J Biol Chem.* 1991 266: 427-433
32. Hsu YM, Guidotti G. Rat brain has the α 3 form of the (Na⁺,K⁺)-ATPase. *Biochemistry.* 1989 28:569-573
33. Wang JL, Hsu YM. Negative regulators of cell growth. *Trends in Biochemical Sciences,* 1986 11: 24-26
34. Hsu YM, Wang JL. Growth control in cultured 3T3 fibroblasts. V. Purification of an Mr 13,000 polypeptide responsible for growth inhibitory activity. *J Cell Biol.* 1986 102: 362-369
35. Wang JL, Hsu YM. Isolation and characterization of a growth regulatory factor from 3T3 cells. *Prog Clin Biol Res.* 1986 217A: 393-396
36. Hsu YM, Barry JM, Wang JL. Growth control in cultured 3T3 fibroblasts: neutralization and identification of a growth-inhibitory factor by a monoclonal antibody. *Proc Natl Acad Sci USA.* 1984 81: 2107-2111
37. Tung TC, Yang TT, Chang HC, Hsu YM, Lin JY. The growth inhibition of S-180 sarcoma cells by Abrus agglutinin treatment in vivo. *Taiwan Yi Xue Hui Za Zhi.* 1981 80: 1-6
38. Tung TC, Chang HC, Hsu YM, Lin JY. Antigenicity of abrus agglutinin-treated Meth-A tumor cells in inbred BALB/C mice. *Taiwan Yi Xue Hui Za Zhi.* 1979 78: 923-933

39. Tung TC, Chang HC, Hsu YM, Hsu CT, Lin JY. Tumor immunity induction in inbred BALB/c mice by abrus agglutinin treated Meth-A fibrosarcoma cells. Taiwan Yi Xue Hui Za Zhi. 1979 78: 605-607
40. Tung TC, Hsu YM, Lin JY, Hsu CT. Syngeneic tumor immunity induction in Swiss mice by Abrus agglutinin treated S-180 sarcoma cells. Taiwan Yi Xue Hui Za Zhi. 1976 75: 53-62

Granted Patents

Patent No.	Grant Date	Title
US 5641748	08-1997	CAIP-like gene family.
US 5656438	08-1997	CAIP-like gene family.
US 5837844	11-1998	CAIP-like gene family.
US 6171800	01-2001	Method of making and binding CAIP polypeptides.
US 6423824	07-2002	CAIP-like gene family.
EP 1294874	05-2006	CD154 variants and uses thereof.
US 7087390	08-2006	CAIP-like gene family.
US 7173046	02-2007	CD40:CD154 binding interrupter compounds and use thereof to treat immunological complications.
DE 60119517	03-2007	CD154 varianten und deren verwendung CD154 variants and their use
HK 1121237	04-2009	血小板凝集分析/ Platelet aggregation assays.
US 7700317	04-2010	Truncated BAFF receptors.
US 8022182	09-2011	Truncated BAFF receptors.
HK 1168147	09-2012	Platelet aggregation assays.
US 8202698	06-2012	Methods of evaluating BAFF.
US 8293237	10-2012	Binding proteins, including antibodies, antibody derivatives and antibody fragments, that specifically bind CD154 and uses thereof.
US 8303958	11-2012	Method of treating immunological disorders by administering truncated BAFF receptors.
US 8409810	04-2013	Platelet aggregation assays using a CD40L-binding agent.
US 8415111	05-2013	Methods of evaluating BAFF.
CA 2629647	05-2013	Platelet aggregation assays.
EP 1955078	07-2013	Platelet aggregation assays.
EP 1608730	11-2013	Truncated BAFF receptors.
US 8617545	12-2013	Methods for use with BAFF antagonists.
US 8685657	04-2014	methods of evaluating BAFF
US 8821883	09-2014	Method of treating B cell cancers by administering truncated BAFF receptors.
US 9494579	11-2016	Human Control antibodies and uses therefor
CA 2681530	03-2017	Binding proteins, including antibodies, antibody derivatives and antibody fragments, that specifically bind CD154